TABLE III

Rumelhart's Syntactic Rules and [Semantic Interpretation Rules][a]

(1) Store → Setting + Episode
⇒ [ALLOW (Setting, Episode)]
(2) Setting → (States)*
⇒ [AND (State, state,.....)]
(3) Episode → Event + Reaction
⇒ [INITIATE (Event, Reaction)]
(4) Event → {Episode | Change-of-state | Action | Event + Event}
⇒ [CAUSE ($Event_1$, $Event_2$) or ALLOW ($Event_1$, $Event_2$)]
(5) Reaction → Internal Response + Overt Response
⇒ [MOTIVATE (Internal-response, Overt Response)]
(6) Internal Response → {Emotion | Desire}
(7) Overt Response → {Action | (Attempt)*}
⇒ [THEN ($Attempt_1$, $Attempt_2$,.....)]
(8) Attempt → Plan + Application
⇒ [MOTIVATE (Plan, Application)]
(9) Application → (Preaction)* + Action + Consequence
⇒ [ALLOW (AND (Preaction, Preaction,...),
{CAUSE | INITIATE | ALLOW} (Action, Consequence))]
(10) Preaction → Subgoal + (Attempt)*
⇒ [MOTIVATE [Subgoal, THEN (Attempt,....)]]
(11) Consequence → {Reaction Event}

[a] The asterisk means that the node in the brackets may be repeated more than once.

seemed inconsistent. These results seem consistent with Ausubel's notion of advance organizers.

In their most recent paper, Kintsch and van Dijk (1978) have further articulated a model of text comprehension. This model is more of a processing model than their earlier work. The text base is postulated to be constructed by a process operating in cycles and constrained by limitations of working memory. The model specified three types of operations: the organization of the meaning elements of a text into a coherent whole; the condensation of full meaning into gist; and the generation of new texts from what was retained through comprehension. The nature of the "semantic structures," viz., macro- and microstructures, critical to the model is carried over from earlier work. Referential coherence is still important to the derivation of the structure of the text base. The application of macrorules is now thought to be under the control of schemas.

Kintsch and Vipond (1978) have produced a way of determining readability of a passage that takes into account characteristics of the reader. In other words, the ordering of difficulty of passages can vary across readers depending on the capacity of a reader's short-term memory (STM) and the size of the chunks in STM.

Story Grammars

Rumelhart's (1975) generative grammar for stories and set of summarization rules was one of the first text grammars to be developed and tested, and it has influenced

the work of other psychologists (e.g., Mandler & Johnson, 1977; Stein & Glenn, 1978; Thorndyke, 1977). In his chapter in Bobrow and Collins (1975), Rumelhart listed two sets of rewrite rules, one called syntactic rules, the other semantic interpretation rules. These are listed in Table III. The semantic rules are listed using a double arrow. The important differences between the two sets of rules are not obvious. Syntactic rules specify how a sentence is decomposed; the semantic rules are intended to specify the relations among the parts.

Essentially a story is thought to consist of an episode in a particular setting. An episode consists of an event plus a reaction, where an event may consist of a change of state or an action, etc. Rumelhart gave several examples of stories and fables that seemed to fit his grammar. He did not claim that the grammar would fit all stories, especially "more complex multiprotagonist stories." However, he stated that it would account for a wide range of simple stories.

I had only limited success trying to apply Rumelhart's grammar to passages that I consider simple stories. For example, the first rule allows a story to be rewritten into a setting plus an episode. The grammar allows for more than one episode because events can be rewritten into an episode; however, a story is allowed only one setting. Many simple stories have, in fact, different settings for different episodes. More importantly, the tree structure that is generated from the grammar fails to capture the relative importance of various episodes. That is, a second episode must be subordinate to the first. In some stories, however, a second episode can seem at least as important as the first even if the first episode caused the second. Therefore, this second episode should be represented at as high a level in the tree structure.

The representation Rumelhart offers fails to capture critical inferences or interpretations that readers derive from a story. For example, in one fable which he represents (Rumelhart, 1977), a dog loses his meat through greed. The dog saw his reflection in the water and, thinking it was a different dog with meat, he snapped at the second piece of meat, only to lose his own. The reader comprehends the passage by noting something like "greed is counterproductive" or "be satisfied with what you have." Rumelhart's schema does not account for this derived, higher level notion.

In addition to developing a generative grammar for stories, Rumelhart has been concerned with specifying rules for summarization of stories. His 1975 article gives a formal set of summarization rules. When the story is represented appropriately in a tree structure, a summary of the story would include the top nodes of the tree, omitting the lower branches which contain details. A summary of an episode involving the protagonist, P, would include a summary of how P tried to get the goal and a summary of the resulting outcome. If the attempt were successful, the summary might be "P got the goal, G, by a certain method, M."

Recall data and summarization protocols have been examined for sets of stories that fit Rumelhart's grammar. Information high in his tree structures should be recalled more often than information (details) in the lower branches. Rumelhart considers the data of Thorndyke (1977) and Meyer (1975) as support for this basic idea. He has also collected data of his own looking at subjects' recall of stories after the subjects had summarized the stories. He found that recall was highly correlated with level in the representation hierarchy; a proposition was predicted to be recalled if a proposition lower in the hierarchy was recalled. The conditional probability of a proposition being recalled, given that it was predicted to be recalled, was about